

Ontario Species at Risk Evaluation Report for
White-rimmed Shingle Lichen
Fuscopannaire à taches blanches
(*Fuscopannaria leucosticta*)

Committee on the Status of Species at Risk in Ontario
(COSSARO)

Assessed by COSSARO as Endangered

October 2020

Fuscopannaire à taches blanches (*Fuscopannaria leucosticte*)

La fuscopannaire à taches blanches est un lichen rare qui pousse sur les arbres dans les forêts détrempées de l'est du Canada. Le lichen se compose de nombreux petits lobes qui se chevauchent (comme des bardeaux). Les lobes présentent habituellement une couleur gris olive foncé sur leur surface supérieure et une bordure blanche bien visible. Les colonies matures produisent de nombreux disques brunâtres (organes de fructification) à leur surface supérieure. Moins de 5 % du thalle mondialement connu du Canada se trouve en Ontario, avec une population provinciale estimée à environ 639 individus répartis en 77 thalles sur 31 arbres (COSEPAC, 2019).

Le lichen répond à plusieurs critères des espèces en voie de disparition, sa population est très petite en Ontario et la province a une très modeste responsabilité de protection, ce qui la place par conséquent dans la catégorie des espèces en voie de disparition.

Cette publication hautement spécialisée «COSSARO Candidate Species at Risk Evaluation for White-rimmed Shingle Lichen» n'est disponible qu'en anglais conformément au Règlement 671/92, selon lequel il n'est pas obligatoire de la traduire en vertu de la Loi sur les services en français. Pour obtenir des renseignements en français, veuillez communiquer avec le ministère l'Environnement, de la Protection de la nature et des Parcs au cossarosecretariat@ontario.ca.

Executive summary

White-rimmed Shingle Lichen, *Fuscopannaria leucosticte*, is a rare lichen that grows on trees in wet forests of eastern Canada. The lichen consists of many small, overlapping lobes (like shingles), with a dark olive-grey colour on their upper surface, and a noticeable white rim on the edges. Mature colonies produce many brownish coloured discs (fruiting bodies) on their upper surface. Less than 5% of the globally known thalli in Canada occur in Ontario, with an estimated provincial population of approximately 639 individuals spread over 77 thalli on 31 trees (COSEWIC 2019). While the lichen meets several criterion for endangered status, a very small population occurs in Ontario, and Ontario has a very small conservation responsibility, and it is therefore assessed as Endangered.

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

White-rimmed Shingle Lichen, *Fuscopannaria leucosticta* is recognized as a distinct taxon. There are no known subspecies or varieties (COSEWIC 2019).

1.1.2. Designatable Units

COSEWIC (2019) recognize only one designatable unit across the Canadian range. Only one designatable unit is recognized at the provincial level.

1.1.3. Native status

White-rimmed Shingle Lichen, *Fuscopannaria leucosticta* is native to Canada and Ontario, and much of its global breeding range occurs in Canada (COSEWIC 2019, NatureServe 2000).

1.1.4. Occurrence

White-rimmed Shingle Lichen, *Fuscopannaria leucosticta* known to occur in Ontario.

1.2. Eligibility results

White-rimmed Shingle Lichen (*Fuscopannaria leucosticta*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G3G5 (NatureServe 2000)
- IUCN: not assessed
- NRANK Canada: N2N3
- COSEWIC: Threatened (May 2019)
- SARA: Not listed (under consideration)
- ESA 2007: unranked
- SRANK: S1S2 (ranked in 2016)

2.2. Distribution in Ontario

The Ontario subpopulation consists of a small cluster of sites from Thunder Bay west to the Quetico region in Rainy River District. It was also found in Lake Superior Provincial Park with a single 1993 collection by S. Sharnoff on the Nokomis Trail near Old Woman Bay (COSEWIC 2019), and recently collected in Giant’s Tomb Provincial Park. Of the known thalli in Ontario, approximately 10 thalli or 13% of population occur in provincial parks, and approximately 75 thalli or 87% of the population occur outside of parks.

2.3. Distribution, status and the broader biologically relevant geographic range outside Ontario

The species is considered to consist of three subpopulations in Canada. The first is largely restricted to a broad Southwest-Northeast band across the mid-latitude of New Brunswick, running from Fredericton to Bathurst with sporadic sites elsewhere. The second subpopulation in Nova Scotia occurs mainly on the east coast of southwestern Nova Scotia (in Shelburne and Queens counties), with sporadic sites throughout the eastern mainland. There is very little likelihood of movement between the three subpopulations as the distances are large and both the Bay of Fundy and a large amount of land separate Nova Scotia and New Brunswick occurrences, and a very large distance separates Ontario from others (COSEWIC 2019).

There was an early record from Quebec, just north of Montréal in the 1880s, although the exact site could not be verified. The lichen is assumed to no longer be present in this area, as satellite imagery indicates that there is no suitable habitat in the general area. Other surveys in Quebec have, to date, failed to discover *F. leucosticta* in the province (COSEWIC 2019).

The Ontario population represents approximately 5% of the known thalli occurrences in Canada (COSEWIC 2019). Based on past declines of trees and thus thalli across Canada, and inferring that these declines will continue into the next 2-3 generations of the data suggests a projected decline of 55% of thalli in Ontario after three generations (in 2053), with 45% of the population remaining (COSEWIC 2019).

The nearest occurrences to the Ontario subpopulation are in Minnesota, Wisconsin, and Michigan, where the species has largely disappeared and not been collected within the last 15 years (COSEWIC 2019)

Table 1. Summary of the number of observed occurrences, trees, and thalli (for 2016 to 2018 surveys). Data indicate the projected number of thalli in each province.

Province	Number of occurrences on observed population	Number of trees on observed population	Number of thalli on observed population	Number of thalli on projected population: -SD	Number of thalli on projected population: Mean	Number of thalli on projected population: +SD
New Brunswick	26	247	764	2474	4315	6206

Nova Scotia	57	224	822	3196	4311	5599
Ontario	5	31	77	Not applicable	639	Not applicable
Quebec	0	0	0	Not applicable	Not applicable	Not applicable
TOTAL	88	502	1663	6,386	9,265	12,521

Table 1. Condition of the Species in Adjacent Jurisdictions and Broader Biologically Relevant Geographic Range

Adjacent Jurisdictions	Biologically Relevant to Ontario (n/a, yes, no)	Condition	Notes & Sources
Quebec	Yes	S1	NatureServe 2018
Manitoba	n/a	n/a	
Michigan	n/a	n/a	
Minnesota	n/a	n/a	
Nunavut	n/a	n/a	
New York	n/a	n/a	
Ohio	n/a	n/a	
Pennsylvania	Yes	SNR	NatureServe 2018
Wisconsin	Yes	S1	NatureServe 2018
<i>Other Relevant Jurisdiction</i>			

2.4. Ontario conservation responsibility

The Ontario population represents approximately 5% of the known thalli occurrences in Canada (COSEWIC 2019), and possibly slightly less of the known thalli occurrences globally.

2.5. Direct threats

Logging and wood harvesting may be a potential threat to this species. However, it is uncertain whether harvesting in marginal or wet forests is a substantial concern. In Ontario, one site (discovered in 2016) was noted to have been harvested in 2017 (COSEWIC 2019). Approximately 13% of known sites from Ontario are in provincial parks. The historical site (1993) is from Lake Superior Provincial Park, but that

occurrence may not be reliable. Approximately 87% of the known population in Ontario is outside of provincial parks and may be subject to this threat.

Pollution may be a threat, as cyanolichens as a group are known to be sensitive to acidification of their habitat (Richardson and Cameron 2004; Hauck and Spribille 2005). The most recent available work suggests soils in some locations have shown only partial recovery or no recovery at all since regulatory changes have emissions standards have taken place (Lawrence et al. 2015), and it is not known what the pH buffering capacity of host tree bark may be.

While there remains significant uncertainty with respect to the impacts of climate change on fog, rainfall, and wind in Atlantic Canada (Lemmen 2016; McClearn 2018), uncertainty of the effects of climate change on Ontario thalli is even higher. However, potential climate change effects cannot be eliminated for this species.

2.6. Specialized life history or habitat use characteristics

Fuscopannaria leucosticta have been found to colonize Eastern White Cedars (*Thuja occidentalis*) in Ontario. Across the species Canadian range, this lichen grows in mature old wet forests that have been undisturbed for more than 50 years. Any combination of threats which affects the habitat requirements are likely to limit the occurrence of this lichen (COSEWIC 2019).

3. Ontario status assessment

3.1. Application of endangered/threatened status in Ontario

3.1.1. Criterion A – Decline in total number of mature individuals

Not applicable.

3.1.2. Criterion B – Small distribution range and decline or fluctuation

Meets criterion for B2a,b(v), Endangered, IAO <500 km², and less than 5 locations and a continued decline in number of mature individuals.

3.1.3. Criterion C – Small and declining number of mature individuals

Not applicable.

3.1.4. Criterion D – Very small or restricted total population

Meets criterion D1 for Endangered, with a very small population of less than 100 thalli known to occur in Ontario.

3.1.5. Criterion E – Quantitative analysis

Not applicable.

3.2. Application of Special Concern in Ontario

Not applicable.

3.3. Status Category Modifiers

3.3.1. Ontario's conservation responsibility

Ontario's conservation responsibility is relatively low, representing approximately 5% of all known occurrences of thalli in Canada (COSEWIC 2019).

3.3.2. Status modification based on rescue effect or level of risk in broader biologically relevant range

Not applicable. There is very little likelihood of movement between the three subpopulations in Canada as the distances are large and both the Bay of Fundy and a large amount of land separate Nova Scotia and New Brunswick occurrences, and a very large distance separates Ontario from others (COSEWIC 2019). It is estimated that any distance larger than 1 km renders potential habitat unsuitable, given the species' low motility (NatureServe 2010).

3.4. Other status categories

3.4.1. Data deficient

Not applicable.

3.4.2. Extinct or extirpated

Not applicable.

3.4.3. Not at risk

Not applicable.

4. Summary of Ontario status

The White-rimmed Shingle Lichen (*Fuscopannaria leucosticte*) is classified as Endangered, in Ontario based on meeting criterion Endangered B2a,b(v), and D1.

This status of this species is consistent with the definition of Endangered under the Endangered Species Act, 2007.

5. Information sources

COSEWIC. 2019. COSEWIC assessment and status report on the White-rimmed Shingle Lichen, *Fuscopannaria leucosticta* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi + 85 pp.

Hauck, M. and T. Spribille. 2005. The significance of precipitation and substrate chemistry for epiphytic lichen diversity in spruce-fir forests of the Salish Mountains, northwestern Montana. *Flora Morphology, Distribution and Functional Ecology of Plants* 200:547 to 562. doi:10.1016/j.flora.2005.06.006.

Lawrence, G. B, P.W. Hazlett, I.J. Fernandez, R Ouimet , S.W. Bailey, W.C.Shortle, K.T. Smith and M.R. Antidormi. 2015. Declining acidic deposition begins reversal of forest-soil acidification in the Northeastern U.S. and Eastern Canada. *Environmental Science & Technology* 49(22): 13103 to 13111. DOI: 10.1021/acs.est.5b02904.

Lemmen, D.S., F.J. Warren, T.S. James and C.S,L. Mercer-Clarke (editors) 2016. *Canada's Marine Coasts in a Changing Climate*; Government of Canada, Ottawa, ON, 274p.

McCLearn, M. 2018. Rising seas and climate change. *Globe and Mail*. May 14th.

NatureServe 2010. *Fuscopannaria leucosticta*, Rimmed Shingles Lichen. https://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.122263/Fuscopannaria_leucosticta, accessed October 25, 2020.

Richardson, D.H.S. and R.P.Cameron. Cyanolichens: Their response to pollution and possible management strategies for their conservation in northeastern North America. *Northeastern Naturalist* 11:1 to 22.

Appendix 1: Technical summary for Ontario

Species: The White-rimmed Shingle Lichen (*Fuscopannaria leucosticte*)

Demographic information

Demographic attribute	Value
Generation time. Based on average age of breeding adult: age at first breeding = X year; average life span = Y years.	5 - 22 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Yes, both observed and projected
Estimated percent of continuing decline in total number of mature individuals within 5 years or 2 generations.	Unknown
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over the last 10 years or 3 generations.	Unknown
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations.	55% reduction
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over any 10 years, or 3 generations, over a time period including both the past and the future.	55% reduction
Are the causes of the decline (a) clearly reversible, and (b) understood, and (c) ceased?	a. Unknown b. Unknown c. Unknown
Are there extreme fluctuations in number of mature individuals?	No

Extent and occupancy information in Ontario

Extent and occupancy attributes	Value
Estimated extent of occurrence (EOO). <i>If value in COSEWIC status report is not applicable, then use geocat.kew.org. State source of estimate.</i>	28,964 km ²
Index of area of occupancy (IAO). <i>If value in COSEWIC status report is not applicable, then use geocat.kew.org. State source of estimate.</i>	
Is the total population severely fragmented? i.e., is >50% of its total area of occupancy in habitat patches that are: (a) smaller than would be required to support a viable population, and	a. No b. No

Extent and occupancy attributes	Value
(b) separated from other habitat patches by a distance larger than the species can be expected to disperse?	
Number of locations. <i>See Definitions and Abbreviations on COSEWIC and IUCN websites for more information on the term "location". Use plausible range to reflect uncertainty if appropriate.</i>	5
Number of NHIC Element Occurrences <i>Request data from MNRF.</i>	4
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Unknown
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Unknown
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	No
Is there an observed, inferred, or projected continuing decline in number of locations?	No
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	No/Unknown
Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations?	No
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No/Unknown

Number of mature individuals in each sub-population or total population (if known)

Sub-population (or total population)	Number of mature individuals
Ontario	77 thalli on 31 trees (known) Total estimated 639 (no confidence estimates)

Quantitative analysis (population viability analysis conducted)

N/A

Threats

Insert text here.

Rescue effect

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	No
Status of outside population(s) most likely to provide immigrants to Ontario	S1
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Unlikely
Would immigrants be adapted to survive in Ontario?	Yes
Is there sufficient suitable habitat for immigrants in Ontario?	Probably
Are conditions deteriorating in Ontario?	Unknown
Is the species of conservation concern in bordering jurisdictions?	Yes
Is the Ontario population considered to be a sink?	No
Is rescue from outside populations likely?	No

Sensitive species

No.

Acronyms

COSEWIC: Committee on the Status of Endangered Wildlife in Canada
COSSARO: Committee on the Status of Species at Risk in Ontario
ESA: Endangered Species Act
EO: Element occurrence (as defined by NHIC)
EOO: extent of occurrence
GRANK: global conservation status assessments
IAO: index of area of occupancy
IUCN: International Union for Conservation of Nature and Natural Resources
MNRF: Ministry of Natural Resources and Forestry
NHIC: Natural Heritage Information Centre
NNR: Unranked
NRANK: National conservation status assessment
SARA: Species at Risk Act
SNR: unranked
SRANK: subnational conservation status assessment
S1: Critically Imperiled
S2: Imperiled
S3: Vulnerable
S4: Apparently Secure
S5: Secure
IUCN: International Union for Conservation of Nature and Natural Resources
CDSEPO: Le Comité de détermination du statut des espèces en péril en Ontario